

Design and production of Pumps and Equipment

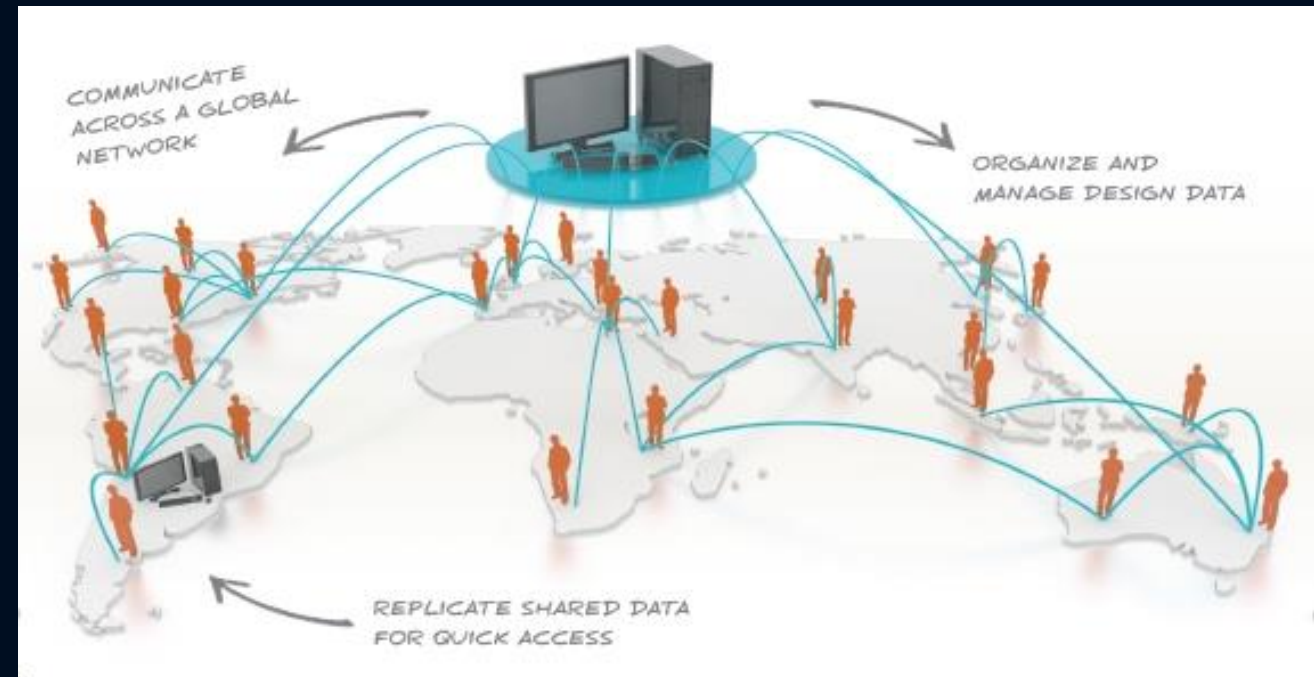
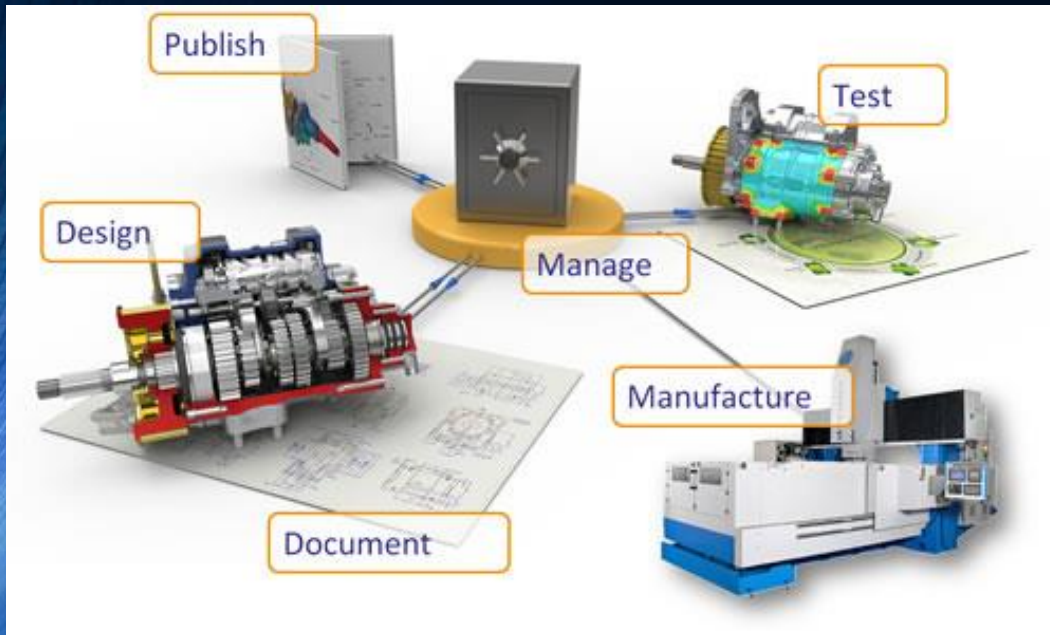
Using the best CAD/CAM/CAE solution for engineering design, validation and manufacturing of products

- Hydraulic and mechanical design of pumps and equipment
- Generating technical and after sales documentation
- Simulation and Validation of products
- Manufacturing of model, prototype pumps and other parts or serial production
- Controlling and Inspection
- After sale services

Product Data Management (PDM) products manage and synchronize our design data across our entire enterprise

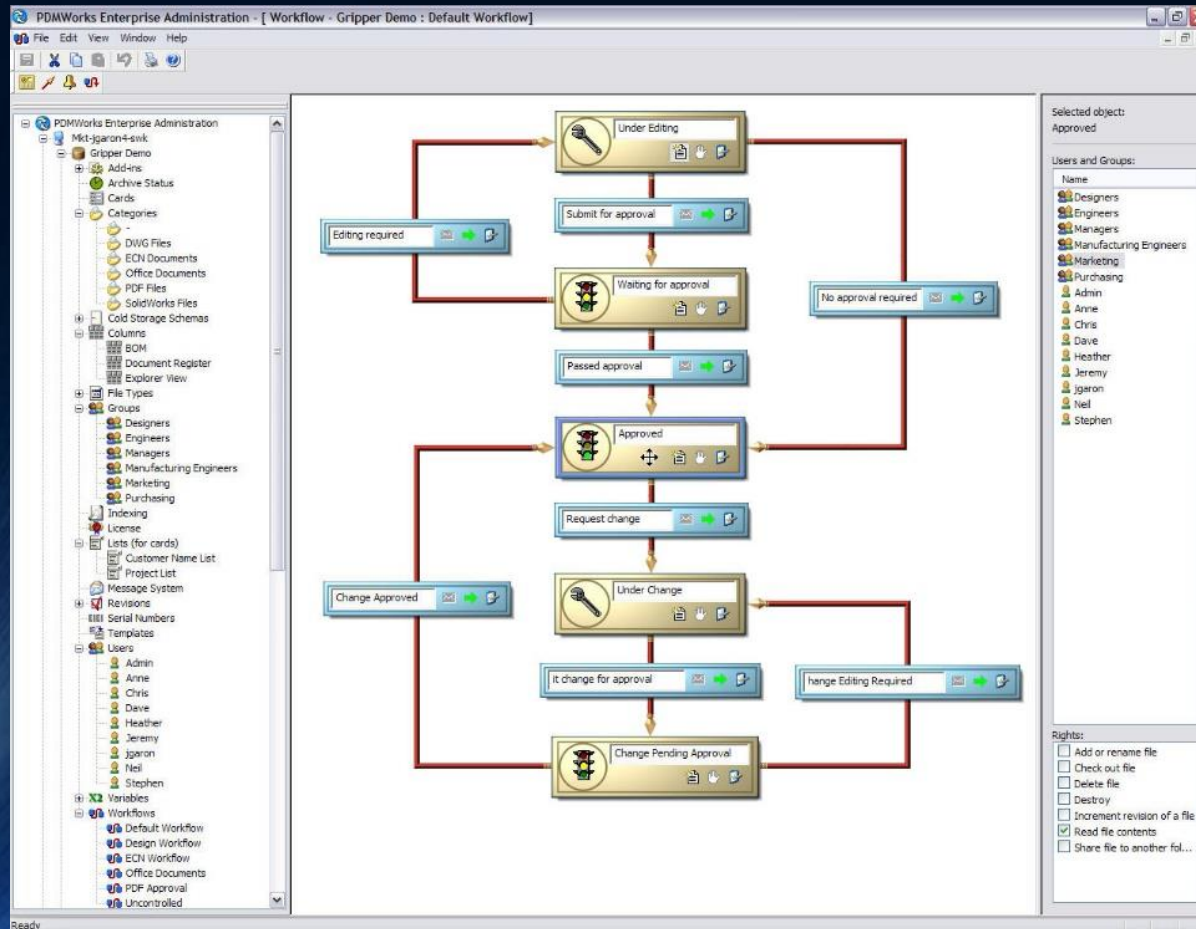
All data are securely stored and indexed in one database – Vault:

- Design data
- Sketches and documentation
- Manufacturing data, NC programs ...
- Supplier data
- Materials
- Cost calculations, etc



Everyone involved in the process share information and collaborate on designs - inside and outside the organization in multiple locations

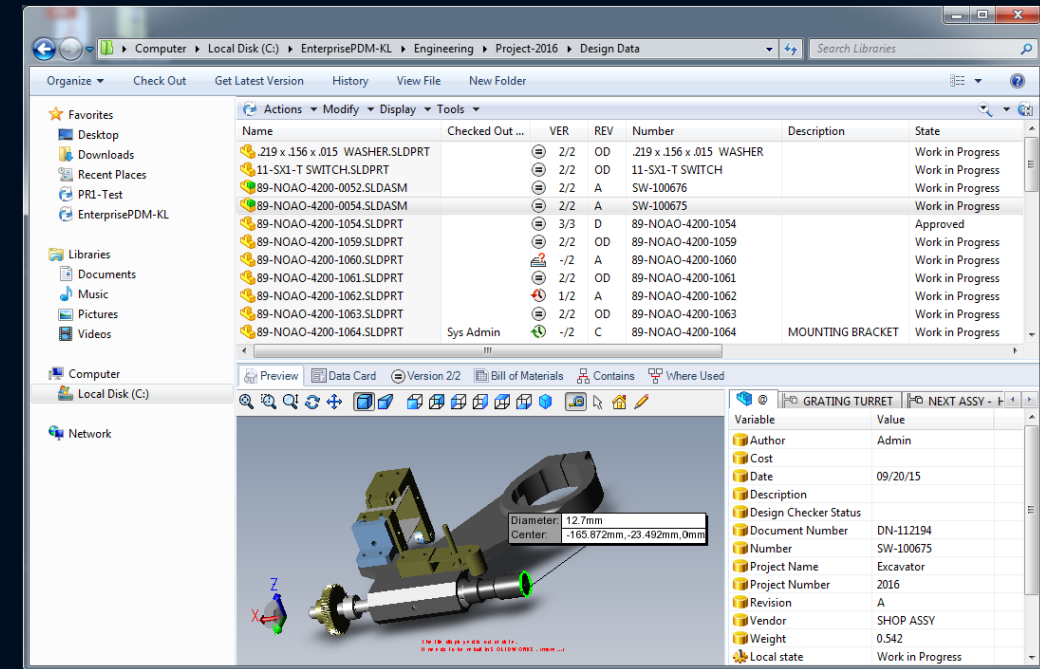
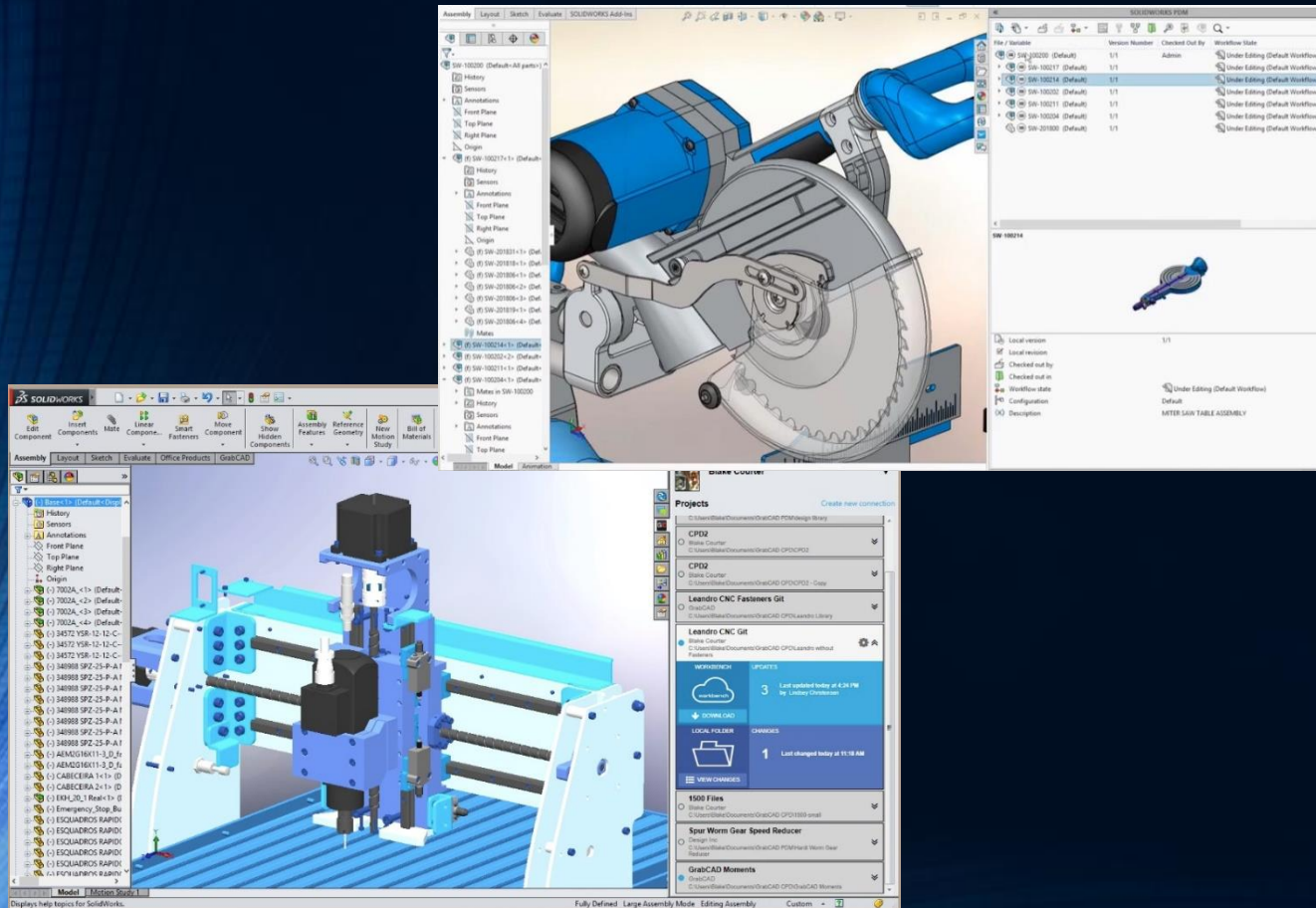
Product Data Management (PDM) products manage and synchronize your design data across our entire enterprise



Creating an electronic workflow to formalize, manage, and optimize development, document approval and engineering change processes

Product Data Management (PDM) products manage and synchronize your design data across our entire enterprise

Revision Control



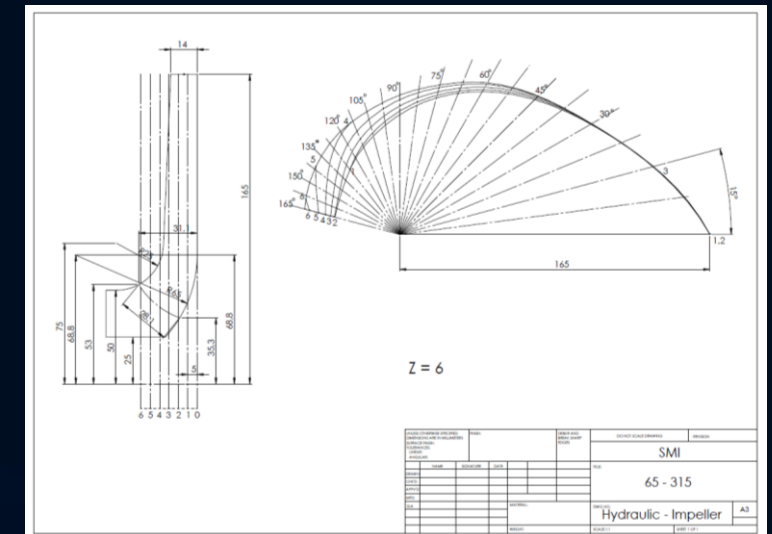
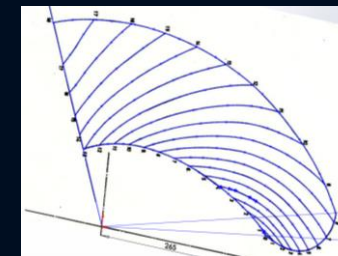
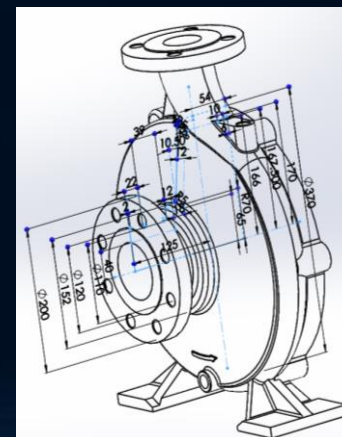
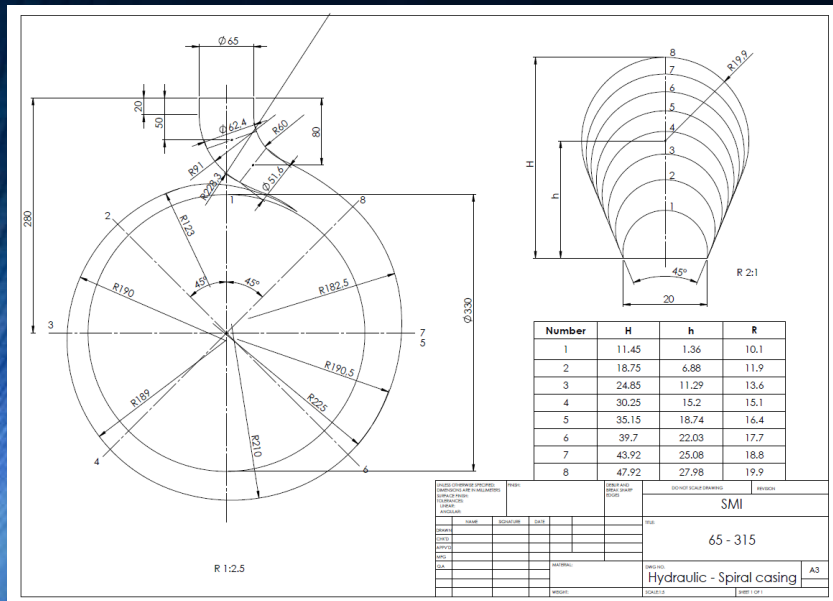
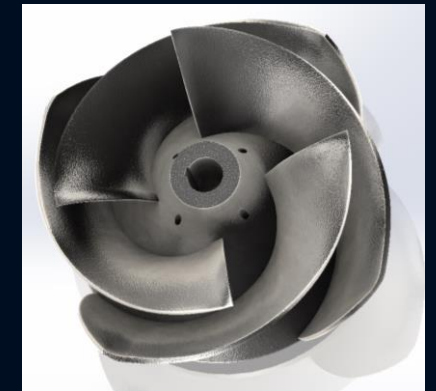
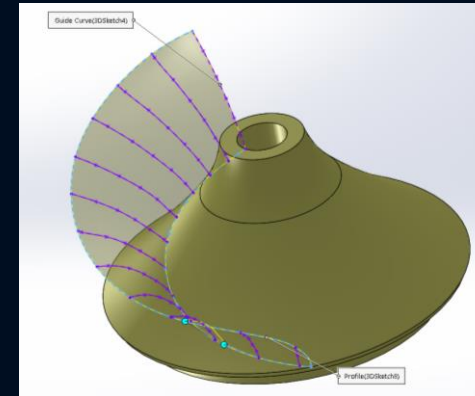
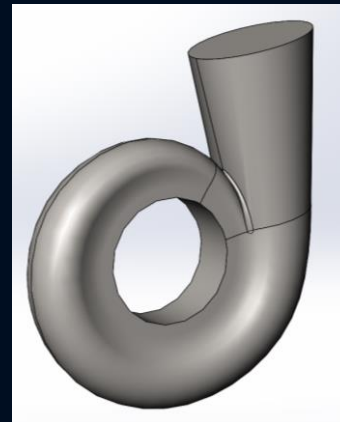
Search and integrated preview In user friendly environment – Windows explorer

Find and Reuse Design Data



Hydraulic and mechanical design of pumps and equipment

Hydraulic and mechanical design of Volute

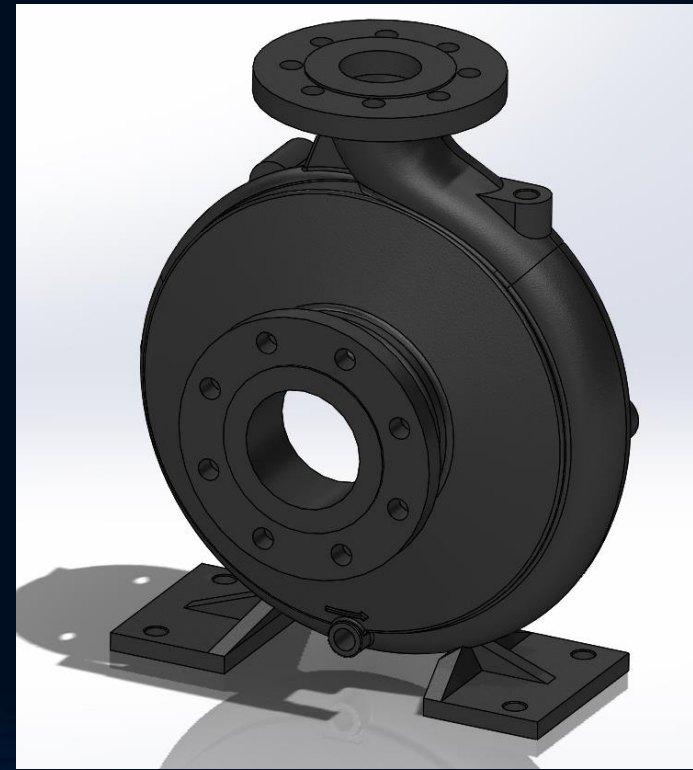
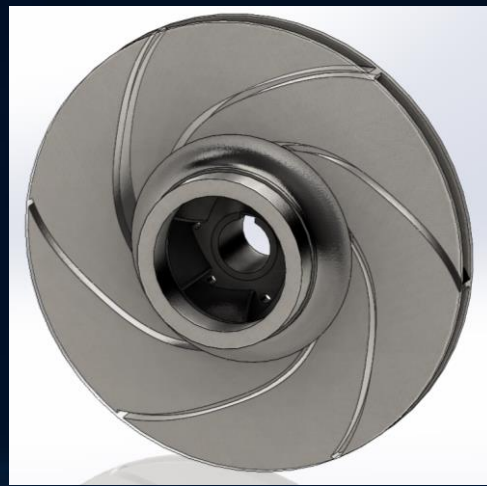
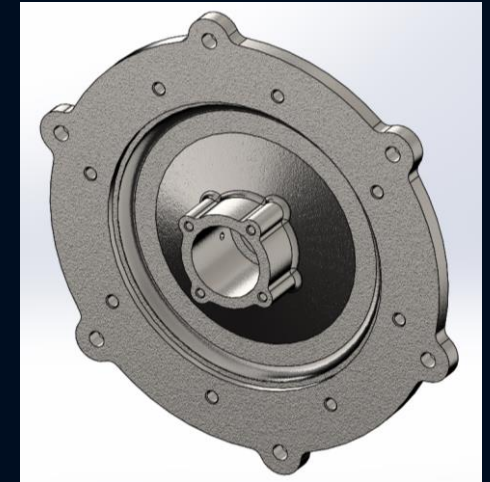
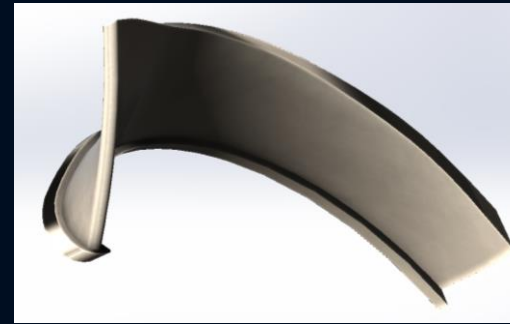
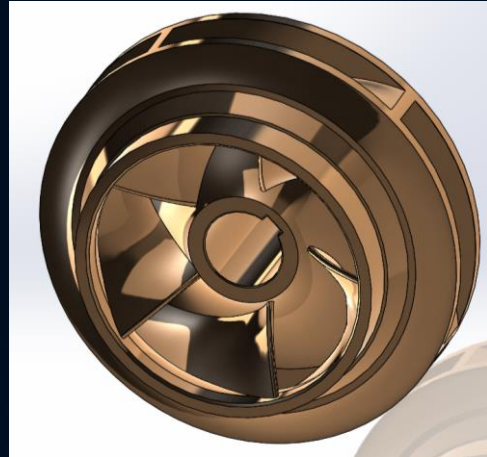
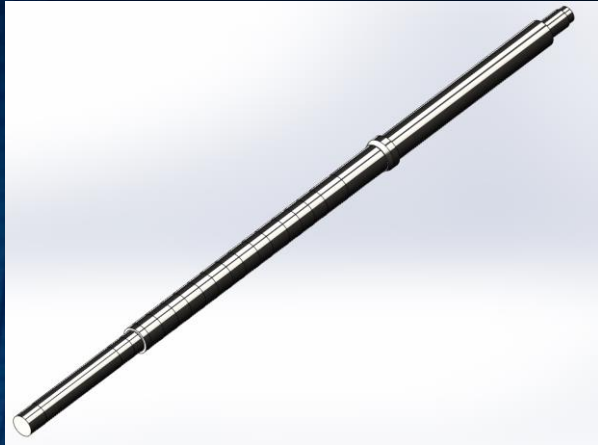


Hydraulic and mechanical design of Impeller



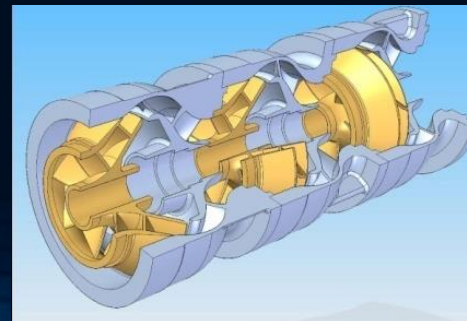
Hydraulic and mechanical design of pumps and equipment

- Mechanical design of other components



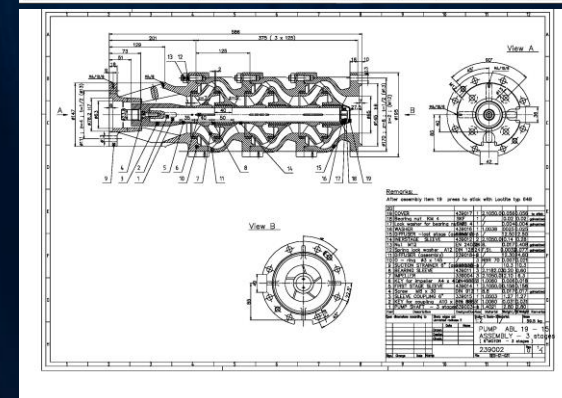
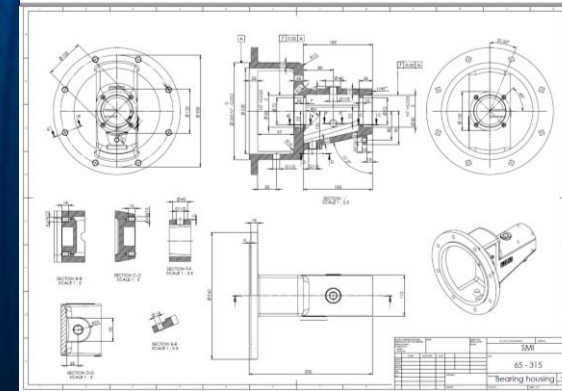
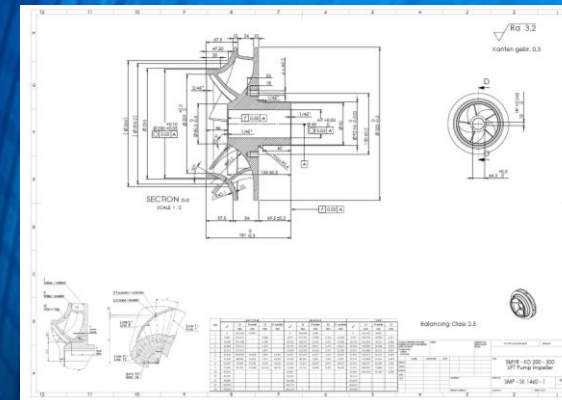
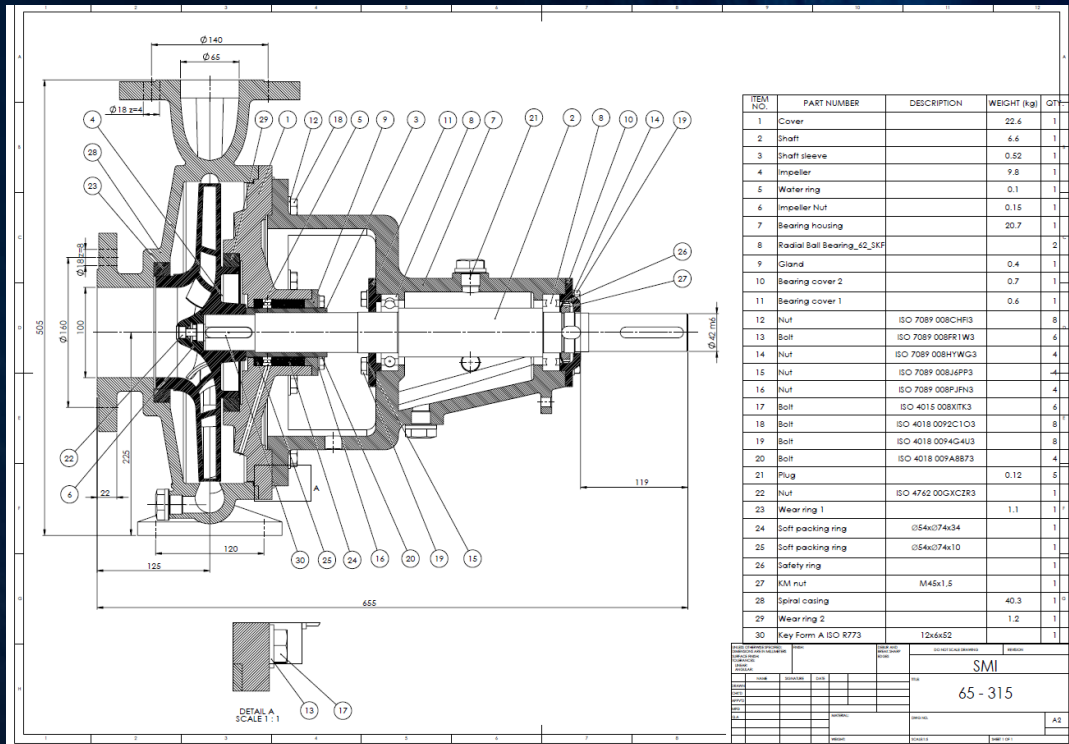
Hydraulic and mechanical design of pumps and equipment

- Creating and checking functionality (motion study) of assemblies and subassemblies



Generating technical documentation and specifications

- Assembly drawings
- Work shop drawings
- Drawings for control and inspection
- Technical specifications
- Templates

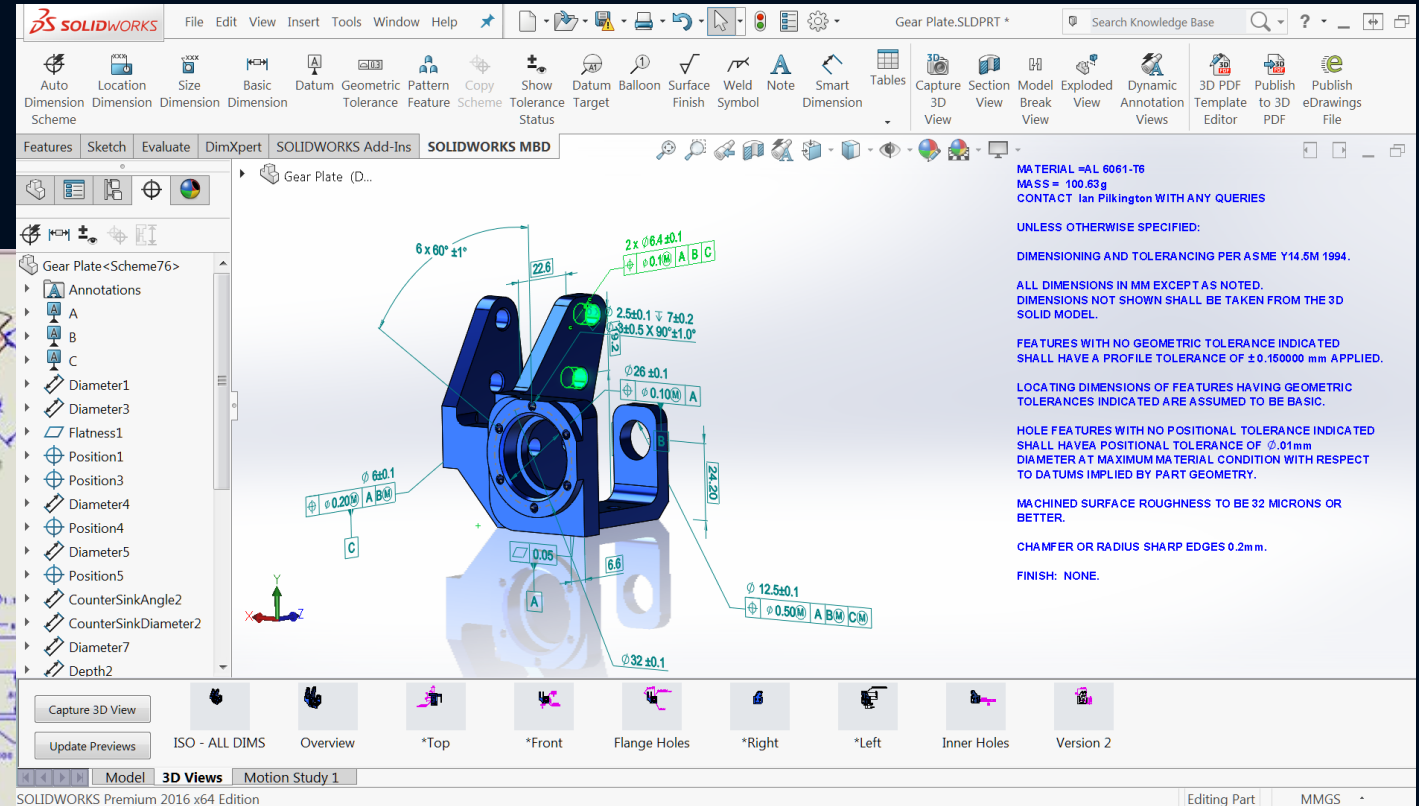
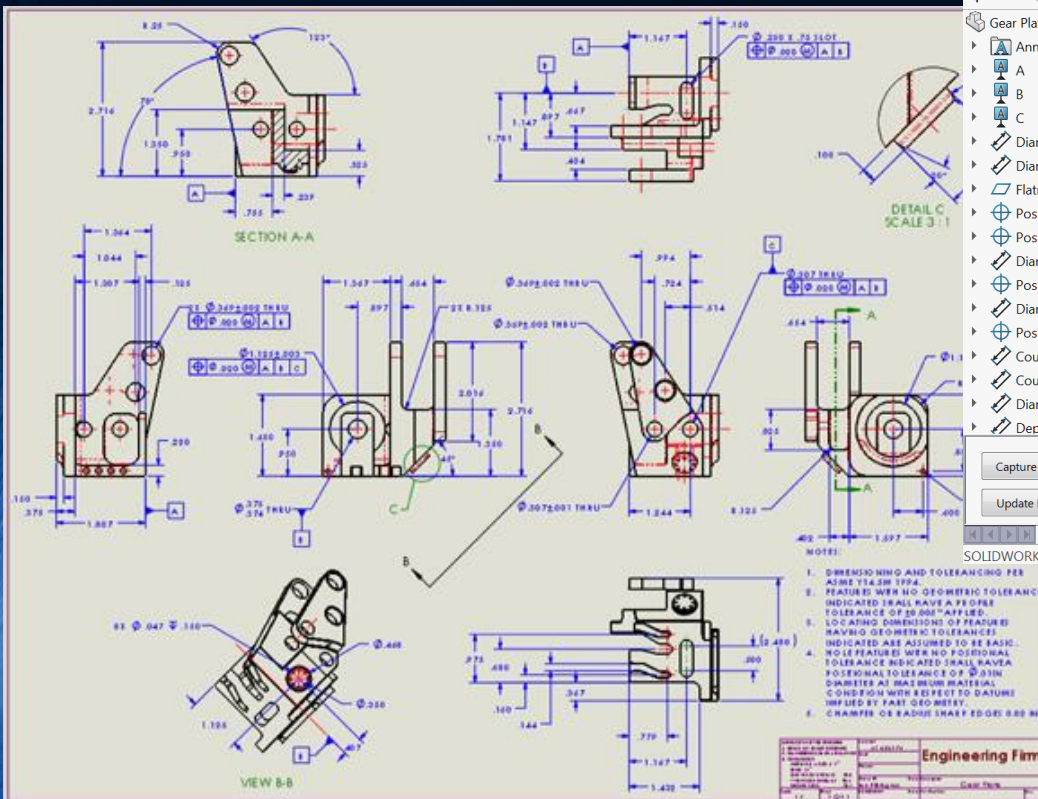


ITEM NO.	PART NUMBER	DESCRIPTION	WEIGHT (kg)	QT.	
1		Cover	22.6	1	
2		Shaft	6.6	1	
3		Shaft sleeve	0.52	1	
4		Impeller	9.8	1	
5		Water ring	0.1	1	
6		Impeller Nut	0.15	1	
7		Bearing housing	20.7	1	
8		Radial Ball Bearing_62_SKF		2	
9		Gland	0.4	1	
10		Bearing cover 2	0.7	1	
11		Bearing cover 1	0.6	1	
12		Nut	ISO 7089 008CHF3	8	
13		Bolt	ISO 7089 008FR1W3	6	
14		Nut	ISO 7089 008HYWG3	4	
15		Nut	ISO 7089 008J6PF3	4	
16		Nut	ISO 7089 008PJFN3	4	
17		Bolt	ISO 4015 008XITK3	6	
18		Bolt	ISO 4018 0092C1O3	8	
19		Bolt	ISO 4018 0094G4U3	8	
20		Bolt	ISO 4018 009A8B73	4	
21		Plug		0.12	5
22		Nut	ISO 4762 00GXCR3	1	
23		Wear ring 1		1.1	1
24		Soft packing ring	Ø54xØ74x34		1
25		Soft packing ring	Ø54xØ74x10		1
26		Safety ring			1
27		KM nut	M45x1.5		1
28		Spiral casing		40.3	1
29		Wear ring 2		1.2	1
30		Key Form A ISO R773	12x6x52		1

Generating technical documentation and specifications

Integrated drawingless manufacturing solution

Classic documentation



Model Based Definition - Documentation



Generating after sales and marketing documentation

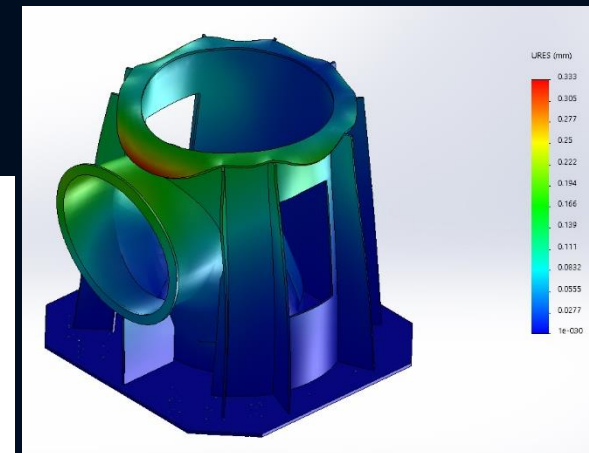
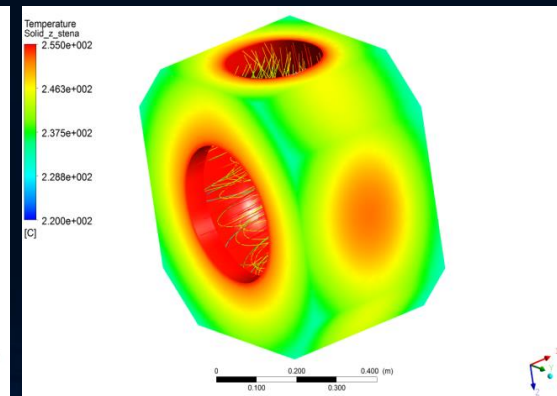
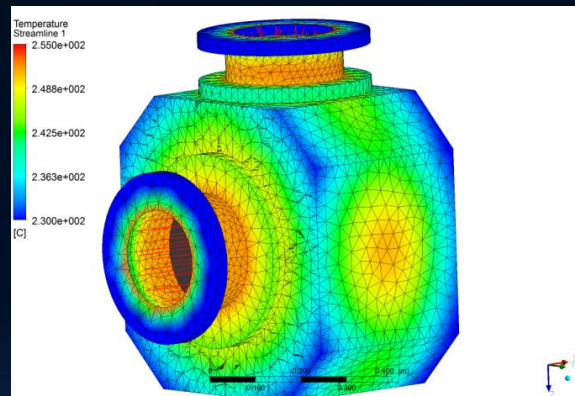
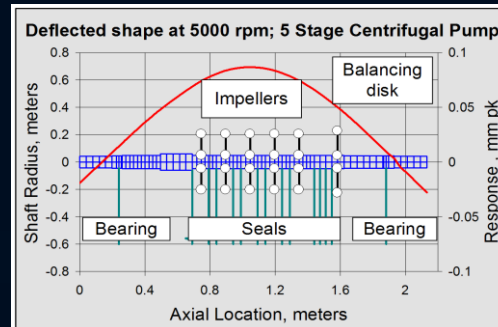
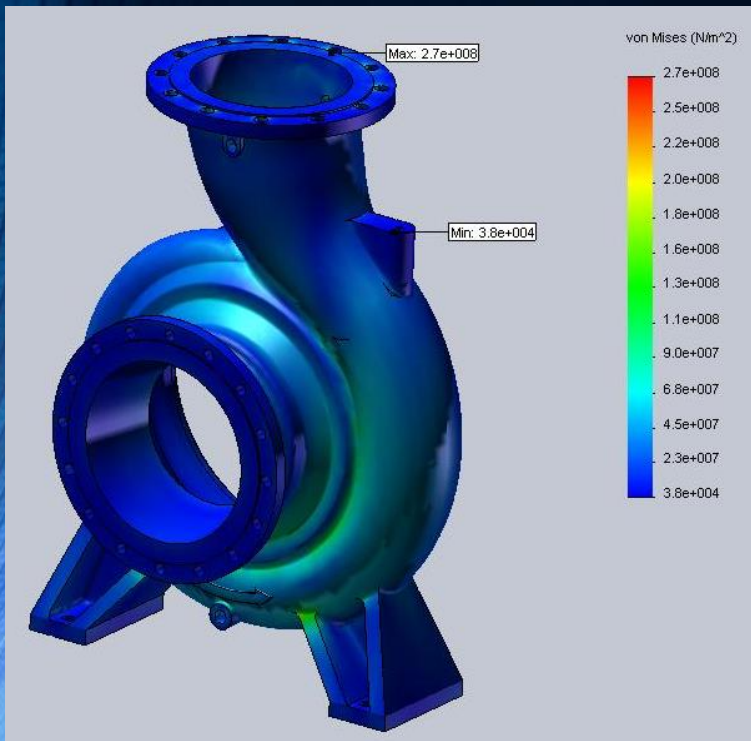
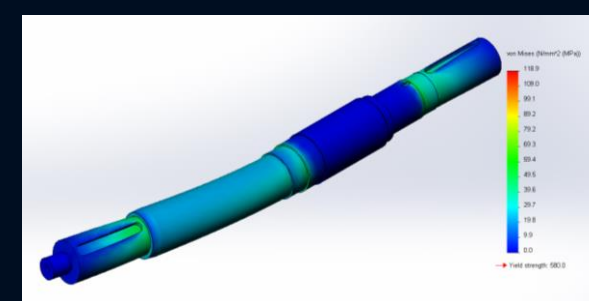
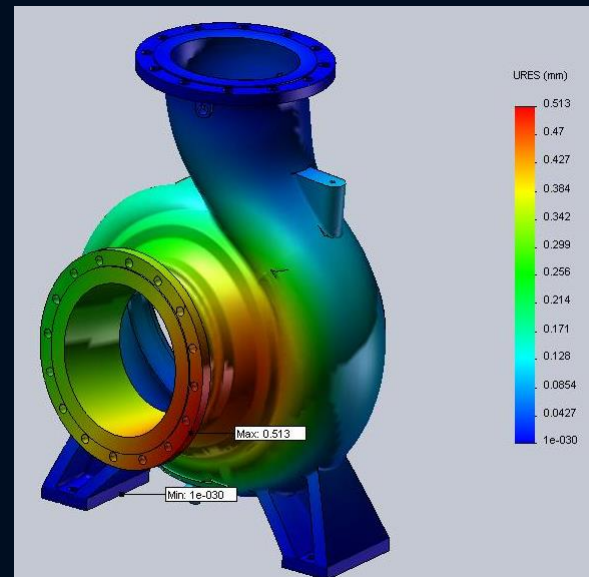
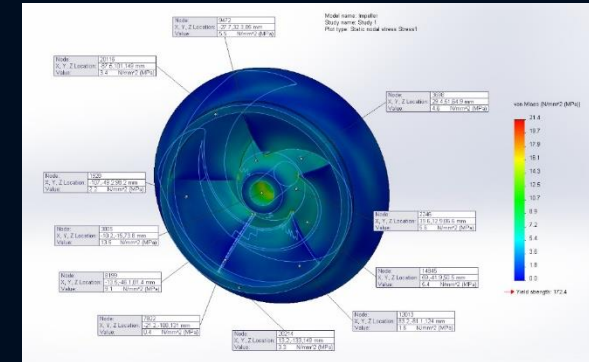
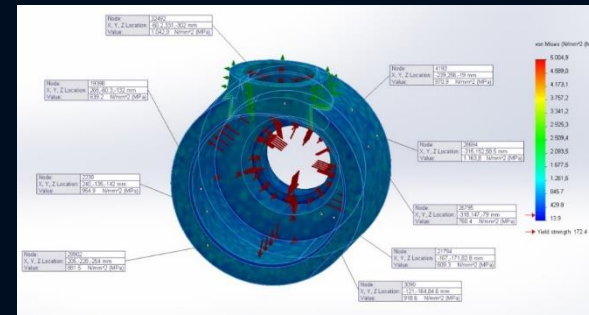
- Spare parts
- Manuals
- Technical specifications
- High quality images, etc...



Simulation and Validation

In design process – during the designer are looking for the best solution

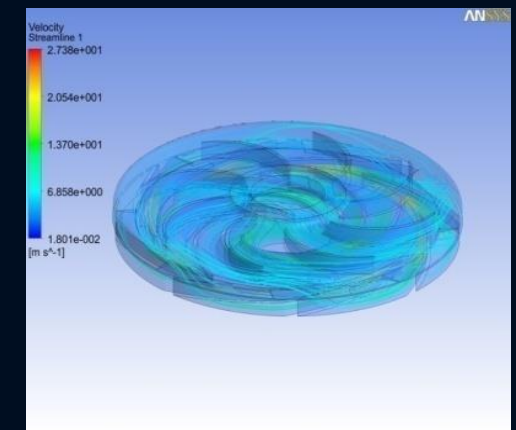
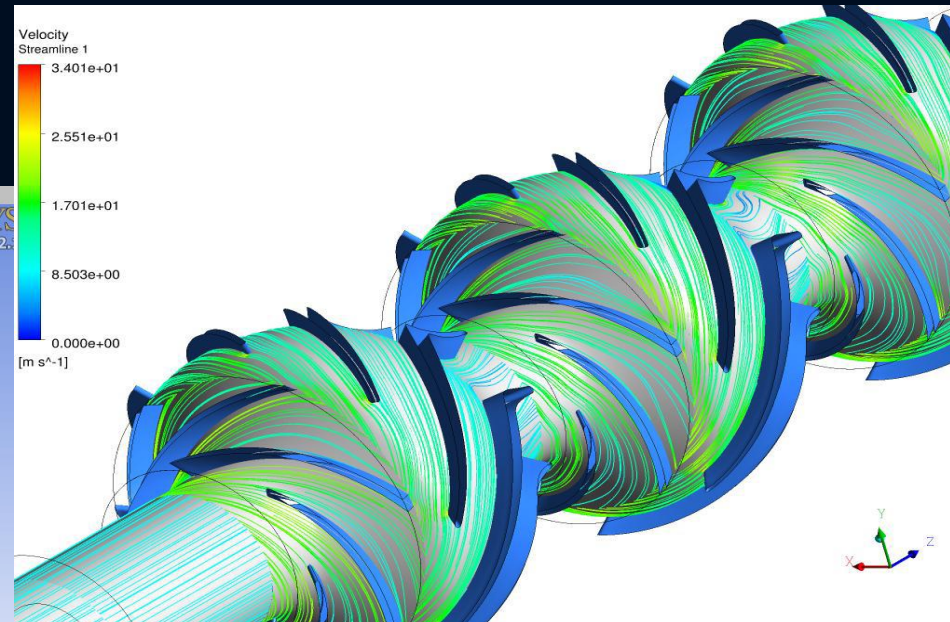
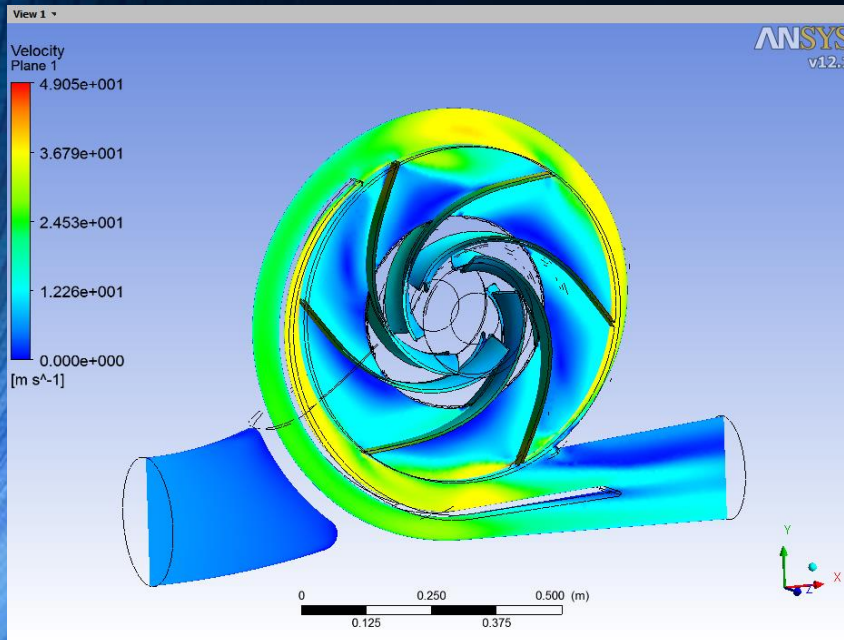
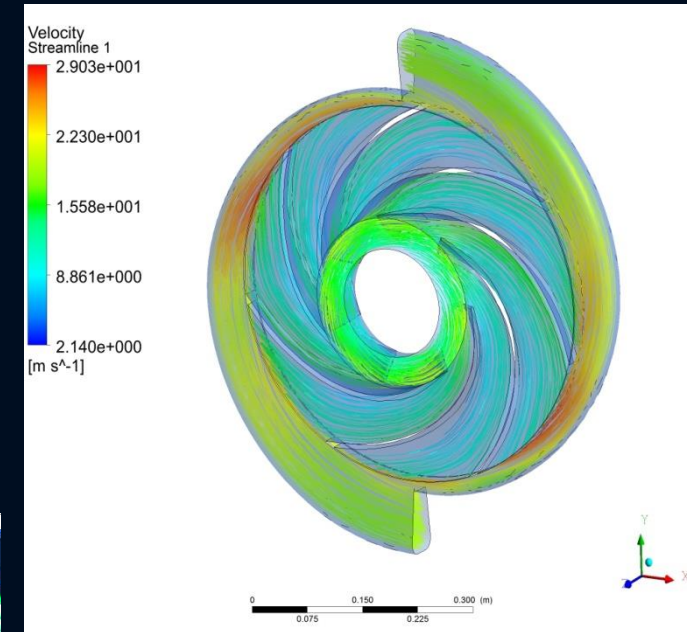
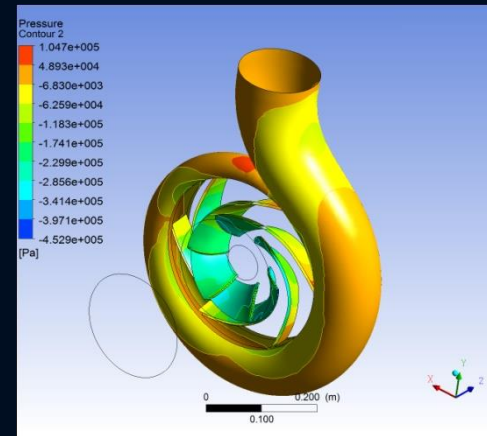
- Structural analysis with static and dynamic load
- Thermal analysis
- Deformation with large displacement
- Structural Optimization analysis



Simulation and Validation

External Validation

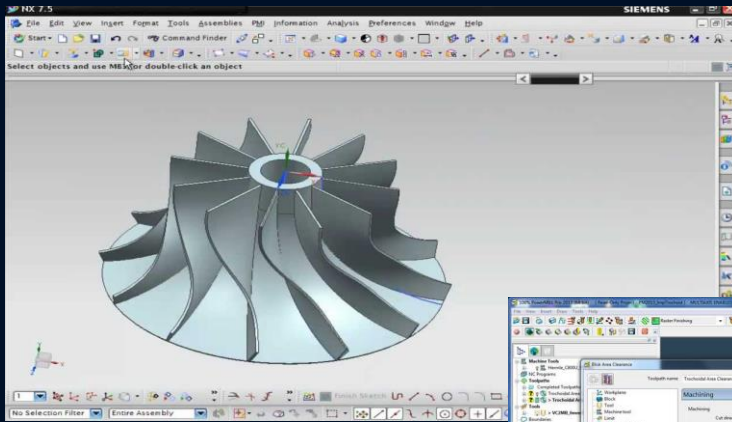
- CFD Analysis - Flow Simulation
- Fluid flow
- Heat transfer
- Displacement distribution from a coupled thermal-stress



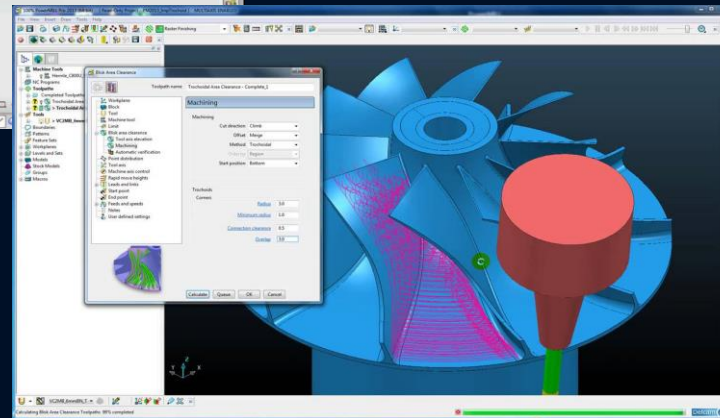
Preparing for production and Manufacturing

SAMPLE:

- Manufacturing of Impeller for prototype pump (with 5 axis machine) using special CAM strategies

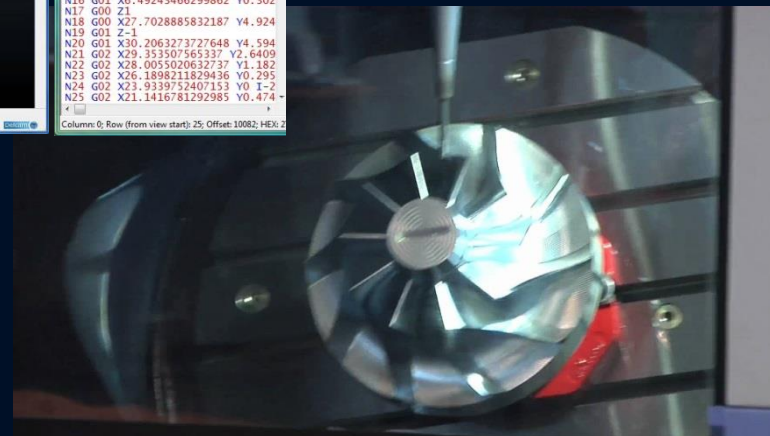
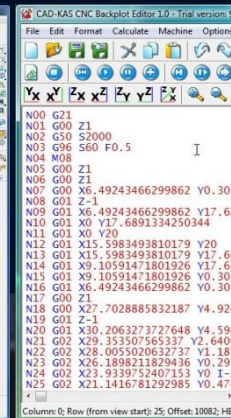


3D CAD MODEL



CAM PREPARATION

NC CODE



MANUFACTURING

Preparing for production and Manufacturing

SAMPLE:

- Manufacturing of Impeller for prototype pump (with 3 axis machine)

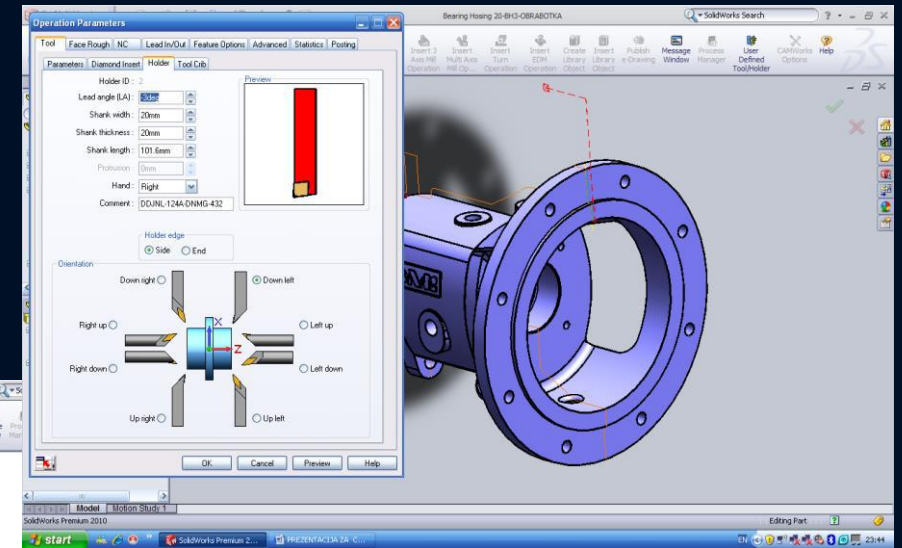
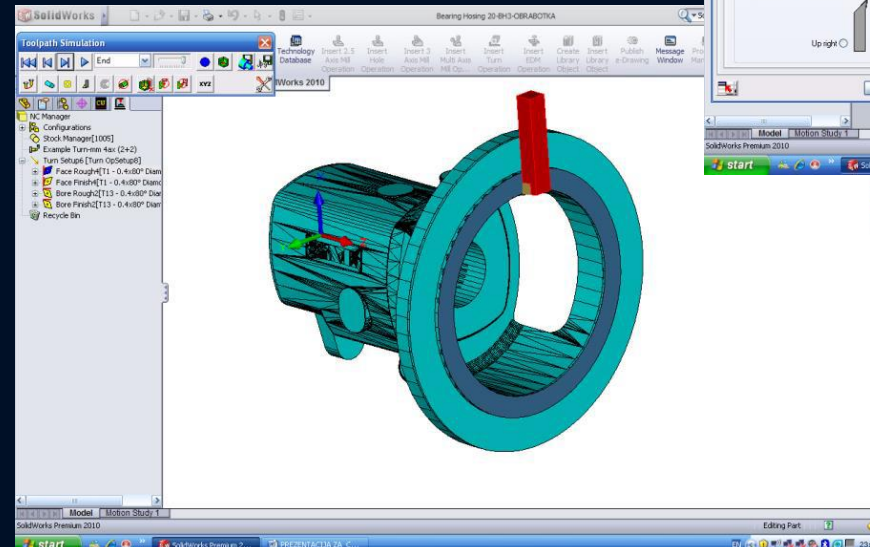
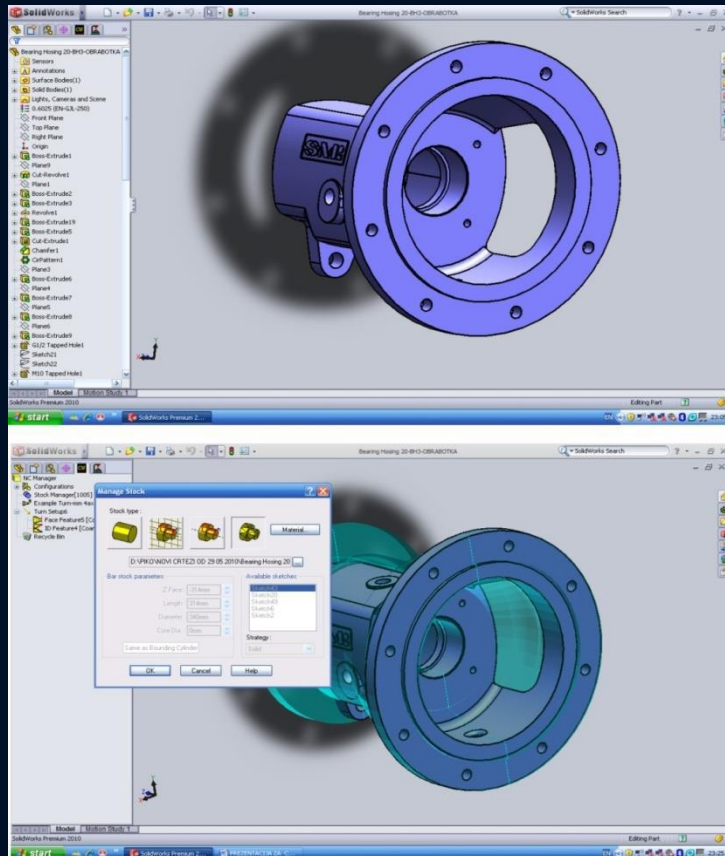
- Manufacturing of difusor



Preparing for production and Manufacturing

Preparing for serial production with implementation of CAM software

- Some 3D models of parts are used as a input in CAM software
- Any change in the drawings is automatically changed in the CNC program for machining



Preparing for production and Manufacturing



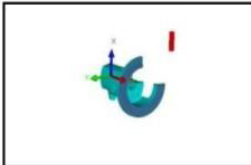
Preparing for serial production with implementation of CAM software

- Technological data: Feed, Speed, Tolls ...
- NC code for: Milling – 2 to 5 axis, Turning, Turn-Mill machines


**My Company Name
SETUP SHEET**

Company	KG	CNC Mach	Example Turn-mm 4a
Date/Time	06/07/10 23:31	Setup#	1 of 1
Material	1005	Programmer	
Setup Name	Turn OpSetup8	Units	MM
Part File	Bearing Hosing 20-BH	Mach Time(min)	10,15


Tool St.	1
Operation	Face Rough4
Insert	CNMG-431
Holder	DDJNL-124A-DNMG-432
Speed	106 RPM
Feed	24,397 FPM
Time(min)	5,66
Tip Len	1.017,86



Tool St.	1
Operation	Face Finish4
Insert	CNMG-431
Holder	DDJNL-124A-DNMG-432
Speed	106 RPM
Feed	0,229 FPR
Time(min)	2,79
Tip Len	796,17



Tool St.	13
Operation	Bore Rough2
Insert	CNMG-431
Holder	DDJNL-124A-DNMG-432
Speed	442 RPM
Feed	101,158 FPM
Time(min)	1,12
Tip Len	1.329,15




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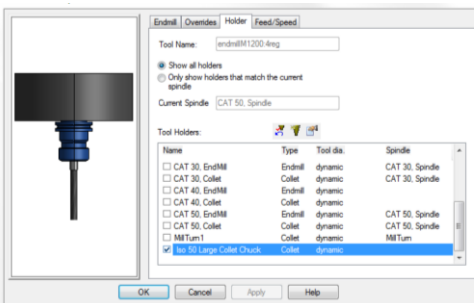
**My Company Name
SETUP SHEET**

Company	KG	Part File	Bearing Hosing 20-BH
Date/Time	06/08/10 20:35	CNC Mach	Example Mill-mm
Material	1005	Setup#	1 of 2
Stock Size	340,00, 340,00, 320,0	Programmer	
Setup Origin	_00,_00,_00	Units	MM
Setup Name	Group1	Mach Time(mi)	1,06

Tool#	42
Operation	Tap1
Tool Description	10.0X1.5 TAP
Holder Description	Add Comment
Holder Number	Default
Speed	213,445877279403
Feed	320,168815919104
Mach Depth	14,90
Min. Tool Prot. Len.	N.A.
Tip Len	577,62
Time	0,71

Minimum	Maximum
X : -45,96194078	45,961940777
Y : -45,96194078	45,961940777
Z : -14,9	28,000000000





08-jun-10 20:37:32 Page 2 of 3

RESULTS

Manufacturing Details

Operation List
Tool List

MANUFACTURING TOOL DETAIL SHEET

Part: G36SM Chamfer
Setup: Setup1 (1 of 1)
Date: Tuesday, March 17, 2015 09:42:28

Crib: basicmetric
Summary:

Slot 1:	facemillM3200	D 32,000 mm	H 30,000 mm		
Slot 2:	center_M1250-0500	D 5,000 mm	L 5,000 mm		
Slot 3:	TD_M0600:J	D 6,000 mm	L 70,000 mm		
Slot 4:	endmillM0800:reg	D 8,000 mm	L 40,000 mm	F 2	T 0,000 mm
Slot 5:	endmillM2000:reg	D 20,000 mm	L 38,100 mm	F 2	T 0,000 mm
Slot 6:	endmillM1200:4reg	D 12,000 mm	L 31,750 mm	F 4	T 0,000 mm
Slot 7:	endmillM1400:reg-ground	D 14,000 mm	L 28,580 mm	F 2	T 2,000 mm
Slot 8:	endmillM1200:4reg	D 12,000 mm	L 25,000 mm	F 4	T 6,000 mm
Slot 9:	endmillM1200:reg	D 12,000 mm	L 25,400 mm	F 2	T 0,000 mm
Slot 10:	endmillM0600:reg	D 6,000 mm	L 35,000 mm	F 2	T 0,000 mm
Slot 11:	endmillM0600:4reg	D 6,000 mm	L 15,880 mm	F 4	T 0,000 mm

RESULTS

NC Code

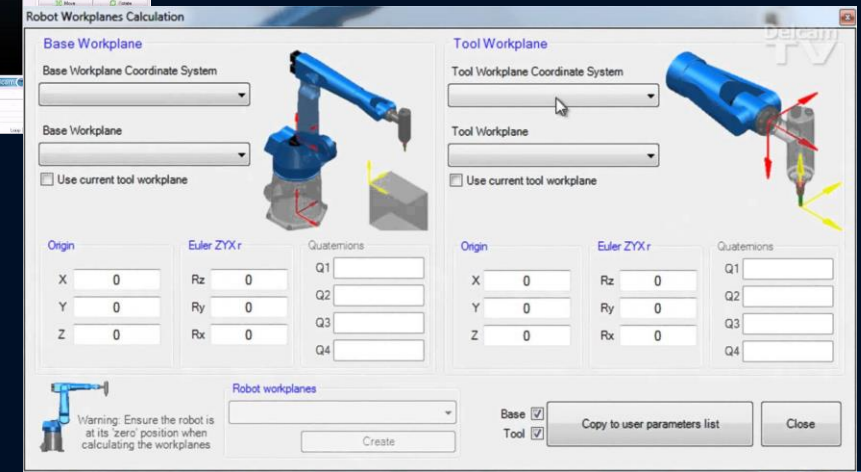
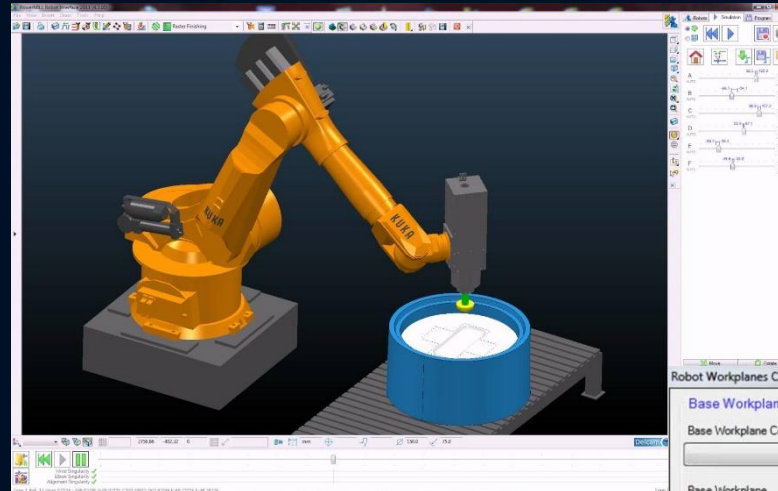
(FINISH FACE1)

```

N25 G0 G40 G49 G80 G90
N30 T1 M6
N35 G54 X326.47 Y5.556
N40 M03 S10000
N45 G43 H1 Z26.0 M8
N50 Z4.0
N55 G1 Z0. F5000.0
N60 X-21.0
N65 Y32.112
N70 X326.47
N75 Y58.668
N80 X-21.0
N85 Y85.223
N90 X326.47
N95 Y111.779
N100 X-21.0
N105 Y138.335
N110 X326.47
N115 Y164.891
N120 X-21.0
N125 Y191.447
N130 X326.47
N135 Y218.003
N140 X-21.0
N145 Y244.558
N150 X326.47
N155 Y271.114
N160 X-21.0
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N185 M9
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N195 G90 G49
    
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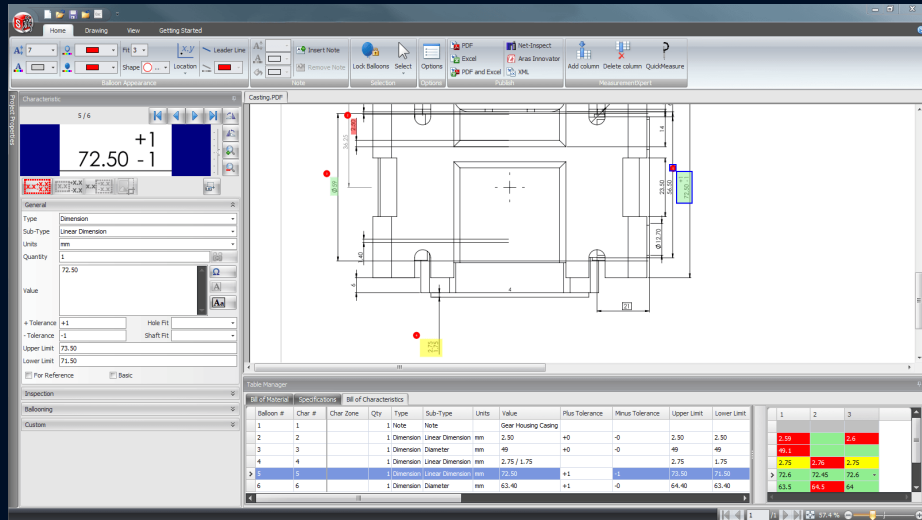
Preparing for production and Manufacturing

Specific industry machining solution
-Robot programming



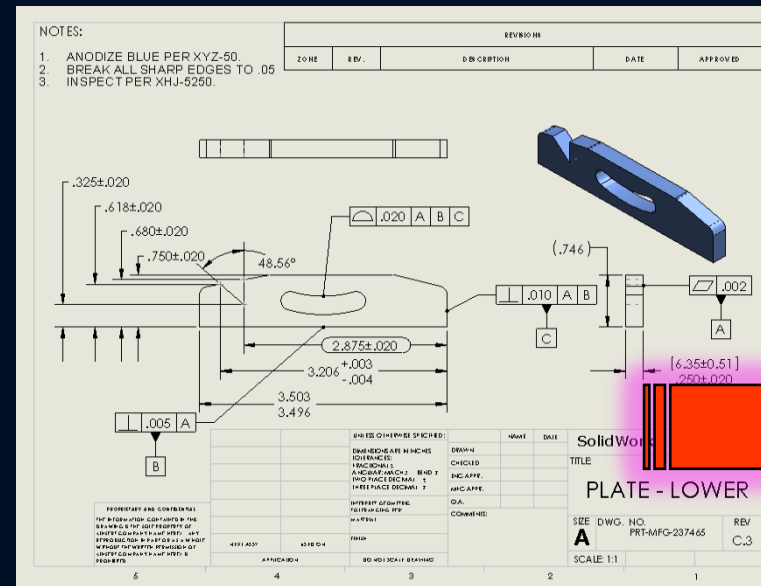
Controlling and inspection

- Automatically Excel table creation (Measuring List) from 2D Drawings in CAD, PDF or JPG format
- Save time and eliminate possibility of mistakes



System recognize:

- Dimension
- Tolerances
- Geometrical tolerances
- Notes



First Article Inspection Report									
1. Part Number		Form 3. Characteristic Accountability, Verification and Conformance Evaluation							
Low-Plate-01		2. Part Name		3. Results		4. Inspection / Test Results		5. Other Fields	
Plate - Lower Drawing		Plate - Lower Drawing		Plate - Lower Drawing		Plate - Lower Drawing		Plate - Lower Drawing	
6. Char No.	7. Reference Location	8. Requirement	9. UoM	10. Upper Limit	11. Lower Limit	12. Results	13. M. Designed Testing	14. M. Non-Conformance Number	15. M. Notes
11	NA	NOTES:							
12	NA	1. ANODIZE BLUE PER XYZ-50							
13	NA	2. BREAK ALL SHARP EDGES TO R5							
14	NA	3. INSPECT PER XHJ-5250							
2	Flattness	0.02	mm	0.00	0.00				
3	Length	250	mm	0.07	0.07				
4	Length	0.746	mm	0.07	0.07				
5	Profile	0.02	mm	0.02	0.00				
6	Perpendicularity	0.02	mm	0.01	0.00				
7	Length	0.875	mm	0.20	0.20				
8	Length	0.208	mm	0.21	0.21				
9	Length	0.503	mm	0.50	0.50				
10	Perpendicularity	0.02	mm	0.01	0.00				
11	Length	0.750	mm	0.07	0.07				
12	Length	0.680	mm	0.07	0.00				
13	Length	0.618	mm	0.04	0.00				
14	Length	0.525	mm	0.05	0.00				
15	Length	0.486	mm	0.00	0.00				
16	Length	0.406	mm	0.01	0.00				
17	Length	0.156	mm	0.06	0.00				
18	Length	0.125	mm	0.03	0.00				
19	Length	0.125	mm	0.03	0.00				
20	Length	0.125	mm	0.03	0.00				
21	Length	0.125	mm	0.03	0.00				
22	Length	0.125	mm	0.03	0.00				

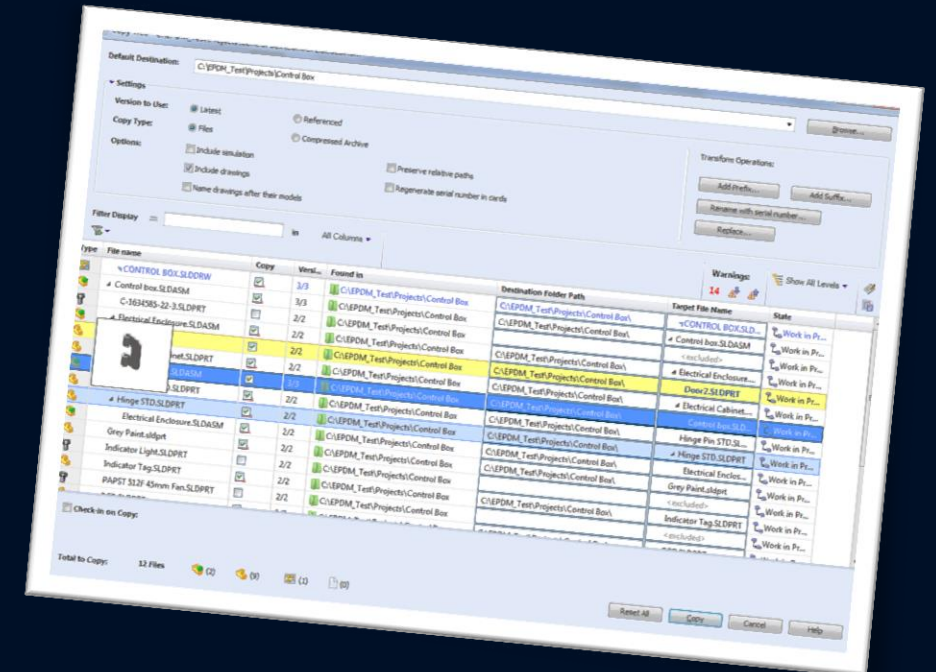
Product Data Management System



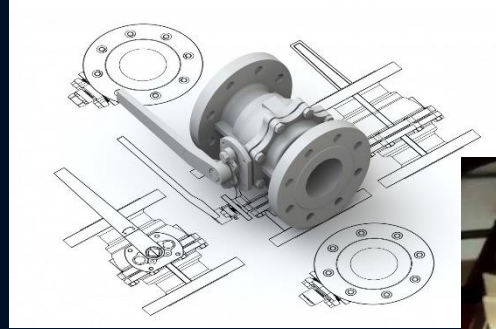
BASIC RULE – EVERUBODY MUST USE SAME DATABASE

- The Data are Securely stored and indexed and concerns about version control and data loss are eliminated
- Sharing and collaborating designs with people inside and outside the organization in multiple locations.
- Create an electronic workflow to formalize, manage, and optimize development, document approval, and engineering change processes.

- Secure Access
- Revision Control
- Find and Reuse Design Data
- Audit Trail
- Integrated Search
- Advanced Search and Favorites
- Integrated eDrawings Preview
- Multi-Document Preview
- Scalability
- Automated Neutral File Creation
- Custom Configuration
- Automated Data Import and Export
- Serial Number Generators
- Distributed Design Teams
- Remote Access
- Automated Approval Process
- Email Notifications



Rapid Prototyping and Reverse Engineering



3D printing



Reverse Engineering - From physical to CAD model